Recessionary Shock, Capital Mobility and the Informal Sector

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Abstract

Using the hybrid of Heckscher–Ohlin and Specific Factor models of trade, we show that the economic recession led to shock results for both capitalists and skilled workers. Some of the unionized unskilled workers lose formal sector employment and move onto the informal sector. When capital moves from the formal to the informal segments, both informal employment and wage can go up in latter's segment. If capital does not move, informal employment expands and wage drops. Thus, recession may have actually benefitted a large number of informal workers.

JEL: F11, O17, D5

Keywords

International trade, informal sector, general equilibrium

Introduction

The recessionary phase that had taken place in some parts of the world, a few years back, affected the consumers' confidence at large. Their confidence had gone down to a considerable extent. This led to a decline in the demand for final goods, especially high-priced goods. Such a negative demand resulted in a fall in price(s) of almost all formal commodities whose prices could be accessed from different sources in literature and reports. One can have a glimpse of such changes in Table 1. However, the extent of the decline in prices is not the same for different commodities. Some firms were affected more by the downturn. For instance, firms producing luxury goods. Goods with income elasticity greater than unity

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Table 1. The Steep Fall in Traded Commodity Prices

Commodity Group	Peak in 2008*	Jan 2009*	Per cent Change
All commodities (excluding crude petroleum)	299.5	189.4	–37
Food	280.6	196.5	–30
Tropical beverages	193.5	165.5	–15
Vegetable oilseeds and oils	370.5	191.7	–48
Agricultural raw materials	228.6	145.6	–36
Minerals, ores and metals	391.6	203.5	–48
Crude petroleum	469.5	155.6	–67

Source: UNCTAD secretariat calculations.
Note: * indicates price indices of all and main commodity groups (in terms of current dollars).

had experienced the biggest percentage fall in demand. This is likely to encompass all high-priced goods, whereas basic necessity goods were relatively insulated from this shock irrespective of the origin of production. At the same time, as the prices are relatively low, informal goods should not have felt the heat of recession to the extent of formal goods.[1]

Therefore, consequent upon the financial crisis and subsequent recession, prices of high-skilled commodities fell to a large extent (see Table 1). Prices of other goods also decreased, capitalists did not get their expected returns from investment and skilled workers' wage rate went down substantially. The UNCTAD Report (2009) says that the global crisis has not only affected the manufacturing trade, but also trade in services. Global services' exports were up sharply, rising by 11 per cent in 2008, with an 8.5 per cent and 15 per cent rise achieved by developed and developing countries, respectively. However, intra-year balance of payments' data for 2008 clearly indicate that the turning point for services' exports growth occurred in the third quarter of 2008, with an abrupt decline in the fourth quarter of 2008. These are some observed phenomena that act as exogenous shocks to any stable economy. The general apprehension is that owing to these shocks all economic agents should suffer. The formal sectors' scenario is quite intuitive and could easily be explained. Nevertheless, what happens to the informal activities, if exist, and informal workers are still unexplored. Exploration of this sector becomes more complicated due to lack of statistical support. In addition, the presence of the informal sector is rampant across the globe. It accounts for 50–80 per cent of total employment in South Asia, 30–50 per cent in South East Asia, 40–50 per cent in Africa, and 55 per cent in Latin America and Caribbean (ILO, 2002). More than 70 per cent of all employment in countries like Zambia (80.7 per cent), Uganda (83.7 per cent), Thailand (72.1 per cent), Nepal (73.3 per cent), Lithuania (72 per cent), Ghana (78.5 per cent) and Gambia (72.4 per cent) falls in the category of the informal sector (ILO, 2010). The developed part of the world is also not free from this. It accounts for 24 per cent in Southern Europe, 10 per cent in Western Europe, 18 per cent in Canada and 8 per cent in USA (ILO, 2002). Hence, one must look at the possible theoretical effects on

informal fragments as, unlike the formal sector, the data are not readily available for this segment.

The underlying idea of this article is somewhat similar to a policy paper by Gruen and Corden (1970). Following Gruen and Corden (1970), several papers have been written to capture a developing economy where both formal and informal sectors exist and produce tradable and non-tradable goods, respectively. Essentially, this structure is an amalgamation of Heckscher–Ohlin (H–O) and Specific Factor (SF) model of trade. Hybrid structure has frequently been used by the development economists to evaluate the impacts of various policy issues.[2] Such a framework is also analyzed in earlier works of Brecher and Alejandro (1977), Beladi and Chao (1993), Beladi and Yabuuchi (2001), Jones and Marjit (1992, 2009) and Marjit (2003, 2005). On the other hand, Marjit and Kar (2009) clearly elaborate the interconnectedness of informal sector with other sectors of the economy and some policy implications.

In a paper, Chaudhuri (2009) has attempted to clarify how recession has impacted the informal workers. He used a standard Harris–Todaro kind of framework, allowing for unemployment of rural, unskilled workers and emigration of skilled workers. This article, using a dual economy model, focuses on why recession may raise informal wages and reduce emigration of unskilled labour. He also talked about the implications of unemployment of unskilled workers. In another paper, Marjit and Kar (2011) demonstrated the effect of recession on informal workers' real wages. Using a three goods and four factors model, they examined the effect of change in commodity price in the skilled sector only. It has been attempted to show how elasticity of substitution between labour and capital determines the output effect in both formal and informal sectors. They give an idea about the robustness of the positive effect on informal wages even when the informal commodity is tradeable. This article is a bit different from the two papers that have been talked about, though we argue almost in the same direction and use a similar framework. Unlike Marjit and Kar (2011), we explain why factor intensity assumption is crucial in determining the effect on informal wage and what role, if any, capital mobility plays. In this article, very briefly, we use a stylized, developing economy where both formal and informal sectors co-exist. Even within the formal sector, labourers used in the production of different commodities are not homogeneous. One is skilled good sector and the other is unskilled good sector where labour enjoys the benefit of a unionized work force. The informal sector employs unorganized, unskilled workers with absolutely inter-sectoral mobile capital.[3] Two central phenomena of the structure are: only the formal goods' prices are internationally determined and the formal, unskilled workers get a fixed wage rate. Formal unskilled wage is, essentially, the key driving force of our article. And, on the other hand, as long as the informal good is non-traded,[4] any international economic shock like recession would not seep into the informal segment of the economy through price effect. Nevertheless, lower income of consumers due to recession may influence domestically-determined informal price. We are ignoring such complexities for simplicity. Thus, whatever happens to that segment is as a consequence of change in relative factor return. Once the recessionary phase starts, it affects the formal sector's price due to lack of demand. By virtue of the structure

of the model, capital gets the first shove as unskilled wage is pre-determined in the formal segment. Capitalists internalizing the distress would have helped increasing the skilled workers' wage had the price of skilled goods not changed. But, this may not happen in reality (also see Table 1). Hence, the return to skilled workers would depend on the degree of initial fright on capital and change in skilled good's price. However, as there is no change in the price of informal goods (assumed), the informal workers must gain as the return to the mobile factor goes down. On the output front, there might be some interesting outcomes. After being saddened in the formal, unskilled segment, capital immediately flows out and subsequently the output contracts. The skilled-good producers would try to substitute the skilled labour by relatively less costly capital. The output effect depends on the relative changes in factor return. In the informal sector, producers economize on labour usage as wage goes up and rental falls. Thus, full employment condition of unskilled labour ensures an increase in output. The basic results that we derive are as follows: due to recession, capitalists must suffer; return to skilled workers will go down; informal activities along with skilled products expand, whereas the unionized formal segment shrinks and the role of capital mobility.

Rest of the article is arranged in the following fashion. Section 2 deals with the basic assumptions and the model. Results are analyzed in Section 3. A variant of the basic model with restricted capital mobility between formal and informal sector is discussed in Section 4. Section 5 provides the concluding remarks.

Basic Assumptions and the Model

Let us assume a small open economy where there are three goods (X, Y and Z). X and Y are produced in the formal sector and Z is produced in the informal sector. Formal workers are organized but not the informal workers. X and Y are traded but Z is not. Capital (K) is the mobile factor of production and hence the return to capital (r) is same everywhere. X uses skilled workers (S) as specific factor and Y uses unskilled labour (L) as the same. Unskilled workers are organized in the formal segment, whereas the informal, unskilled workers have to face a competitive market. Therefore, unskilled wage in the formal and informal segments are not identical. The underlying assumption behind the existence of informal activity is that those who don't find jobs, in the formal, unionized market, immediately rush to the informal segment. No one can afford to remain unemployed and one must note that the general concern about poor people is not the lack of job opportunities but the wage rate at which they are forced to work. This phenomenon is very much present here since formal workers are likely to get higher wage ($\overline{w}$) than their informal counterparts.

S gets w_s as the wage. Unskilled workers are monopolized through trade union in Y. They get $\overline{w}$ as wage. Unskilled labourers get w in the informal sector. Prices of the traded goods are obtained from the international market by virtue of small-country assumption. All markets are assumed to be competitive. Moreover, we have the standard neo-classical assumptions of constant returns to scale (CRS) and diminishing return to factors. The following set of equations describes the

model. The interpretations of symbols are usual and well used in trade models (Jones, 1965, 1971). We use the following notations: $P_j \Rightarrow$ price of the j[th] commodity ($j = X, Y, Z$); $w_s \Rightarrow$ skilled wage; $\overline{w} \Rightarrow$ unskilled formal wage; $w \Rightarrow$ unskilled informal wage; $r \Rightarrow$ rate of return to K; $a_{ij} \Rightarrow$ per unit employmentshare of the i[th] factor in j[th] commodity ($i = S, L, K$ and $j = X, Y, Z$); $\theta_{ij} \Rightarrow$ value share of the i[th] factor in j[th] commodity ($i = S, L, K$ and $j = X, Y, Z$); $S \Rightarrow$ total supply of skilled labour; $\overline{L} \Rightarrow$ total supply of unskilled labour; $\overline{K} \Rightarrow$ total supply of capital K; $\lambda \Rightarrow$ employment share of factor in respect of total factor supply; $|\lambda| \Rightarrow$ the factor input co-efficient matrix; a hat over a variable signify proportional change.

Competitive requirements for profits to be just exhausted are given by:

$$w_s a_{sx} + r a_{kx} = P_x \tag{1}$$

$$\overline{w}\, a_{ly} + r a_{ky} = P_y \tag{2}$$

$$w\, a_{lz} + r a_{kz} = P_z \tag{3}$$

$\overline{w} > w$ (sensible assumption)

On the other hand, competitive conditions that factors be fully employed are:

$$a_{sx}.X = \overline{S} \tag{4}$$

$$a_{ly}.Y + a_{lz}.Z = \overline{L} \tag{5}$$

$$a_{kx}.X + a_{ky}.Y + a_{kz}.Z = \overline{K} \tag{6}$$

The solution to the system is very straightforward. For given commodity prices we can solve for three unknown factor returns, w_s, w and r. $\overline{w}$ is already fixed by the trade union. Because of standard neo-classical CRS assumption, we have all technological coefficients, that is, a_{ij}s. Therefore, outputs – X, Y and Z can be found from equation (4) – (6) if the factor endowments are constant at $\overline{S}$, $\overline{L}$ and $\overline{K}$.

Results and the Analysis

We start from the fact that prices of the formal sector goods have gone down. Returns to capital and skilled labour have also decreased simultaneously. First, we shall corroborate these facts by using a simple general equilibrium trade model that we have just framed. Then we shall turn to examine the consequences on the informal workers and activities.

The comparative static properties of our model can be established by considering the effects of changes in the parameters like prices of commodities. For this purpose, we assume the technologies to be given and constant.

Effects on Factor Returns

The underlying idea of this section is very simple to understand. As long as goods are bought from and sold only in the domestic market, recession would not be able to put its mark on those goods and associated factors' return if we assume away the income effect.[5] This is exactly what happens to our unskilled, informal sector and the reverse takes place for the traded goods comprising of skilled goods and unskilled, formal goods. Once there is a change in the prices of the goods, factors' return must change. The extent of change would depend upon the specificity of use, existence of trade unions and factor mobility. Now let us chalk out the channels through which these price changes alter the returns to factors.

Differentiating the price equations totally and rearranging yields

$$\hat{w}_s\theta_{sx} + \hat{r}\theta_{kx} = \hat{P}_x \tag{7}$$

$$\hat{\bar{w}}\theta_{ly} + \hat{r}\theta_{ky} = \hat{P}_y \tag{8}$$

$$\hat{w}\theta_{lz} + \hat{r}\theta_{kz} = \hat{P}_z \tag{9}$$

$$\hat{\bar{w}} = 0,$$

as because of trade union negotiation wage for organized labour is fixed at $\bar{w}$.

Solving for $\hat{r}$ and $\hat{w}_s$ we get

$$\hat{r} = \frac{\hat{P}_y}{\theta_{ky}} \tag{10}$$

$$\hat{w}_s = \left(\hat{P}_x - \frac{\hat{P}_y}{\theta_{ky}}\theta_{kx}\right)\frac{1}{\theta_{sx}} \tag{11}$$

$\hat{r} < 0$ if $\hat{P}_y < 0$. The intuition is very clear. The other factor used in Y is labour whose return is fixed at $\bar{w}$. Any change in the price of final commodity must be totally appropriated by capital. Since capital is mobile across X and Y, the return to skilled labor should crucially depend on the change in the price of X and on the factors' share in the commodity price. From equation (11)

$$\hat{w}_s < 0 \text{ iff} \left(\hat{P}_x - \frac{\hat{P}_y}{\theta_{ky}}\theta_{kx}\right) < 0 \text{ Or, } \frac{\hat{P}_x}{\hat{P}_y} < \frac{\theta_{kx}}{\theta_{ky}} \tag{12}[6]$$

The conventional notion is that skilled labour using X must also be using more capital than Y. In that case, $\frac{\theta_{kx}}{\theta_{ky}} > 1$. If both P_x and P_y fall at the same rate, w_s must fall when $\theta_{kx} < \theta_{ky}$ and would rise otherwise. The argument is as follows.

$\hat{r}$ must be more than $\hat{P}_y$ (as $0 < \theta_{ky} < 1$), because $\hat{P}_y$ is a weighted sum of $\hat{r}$ and $\hat{\bar{w}}$ but no change in unionized wage is possible. When P_x falls at a rate identical with P_y and r falls at a rate higher than this, w_s would also decrease but at a lower rate than that of r. Therefore, if both P_x and P_y fall at the same rate, w_s must fall.[7] In case when P_x is reduced at a rate higher than P_y, the possibility of $|\hat{w}_s| > |\hat{r}|$ arises. This depends on factors' share in price. Note that, here, both $\hat{w}_s$ and $\hat{r}$ fall simultaneously.

A fall in the price of Y is actually dampening the negative effect on $\hat{w}_s$. Because when P_y falls r also falls, and being the mobile factor it also shares the blow of recession a bit. Even under certain circumstances w_s may turn out to be the most horrible sufferers.

Substituting $\hat{r}$ and from equation (9) we get

$$\hat{w} = \left(\hat{P}_z - \hat{r}\theta_{kz}\right)\frac{1}{\theta_{lz}}$$

If $\hat{P}_z$ is assumed to be constant and we substitute the value of $\hat{r}$, the above equation boils down to

$$\hat{w} = -\hat{P}_y \frac{\theta_{kz}}{\theta_{ky}} \cdot \frac{1}{\theta_{lz}} > 0 \text{ (Since } \hat{P}_y < 0) \qquad (13)^8$$

Whether informal, unskilled wage increases or not that crucially depends on the change in P_y. If P_y falls informal workers must gain irrespective of factor intensity assumption. Nevertheless, if labourer's share in Z increases (capital's share falls), return to informal workers increases at a lower rate. However, P_x can not affect w. The reason is that the structure is of H-O nugget (Jones & Marjit, 1992) kind and r gets determined from equation (2) alone.

The argument behind an increase in w is very simple and clear-cut. Driven by a slash in the rental in the formal segment, capital flocks into informal segment and creates an excess demand for informal labourers. This excess demand pulls up the informal wage. Informal unskilled labourers are better off. While the labour union puts the safeguard on organized unskilled workers.

Therefore the proposition is immediate:

Proposition 1.
Consequent upon recession:

(a) Capitalist must suffer if both the formal goods experience a price cut or only P_y falls.

(b) Return to skilled workers will go down if both P_x and P_y fall at the same rate given that $\frac{\theta_{kx}}{\theta_{ky}} < 1$.

Proof.
See discussion above.

Here it is important to note that under the assumption of a same rate of fall in the prices of all goods (say $\hat{P}_x = \hat{P}_y = \hat{P}_z = \hat{P}$), the relevant expression for the change in informal wage becomes $\hat{w} = \frac{1}{\theta_{lz}}\hat{P}\left(\frac{\theta_{ky} - \theta_{kz}}{\theta_{ky}}\right)$. Therefore, informal wage would fall if $\theta_{ky} > \theta_{kz}$. However, when $\theta_{ky} < \theta_{kz}$ informal wage would go up under recession. In fact, the change in P_z can easily be assumed to be a fraction of changes in P_x and P_y as demand for Z comes from the income generated out of X and Y. Let it be < 1. Under these circumstances, $\hat{w} = \frac{1}{\theta_{lz}}\hat{P}\left(\alpha - \frac{\theta_{kz}}{\theta_{ky}}\right)$. Therefore w would rise if $\alpha < \frac{\theta_{kz}}{\theta_{ky}}$ and the explicit condition for a hike in informal wage is $\alpha\theta_{ky} < \theta_{kz}$. This implies that even under the condition of capital-intensive Y, w has a chance to go up if P_z falls (if at all) at a rate lower than that of in P_x and P_y. Similarly, one can derive the modified condition with α for a decrease in informal wage.

Output Effects

As the prices of the goods alter, there is subsequent amendment in the factor returns. Keeping the endowments of factors constant, producers would go for substituting the factors in use depending on the elasticity of substitution and internal reallocation of factors among different uses. The effects on output could be formally derived as follows.

Totally differentiating the full employment condition (4) – (6) and using the concept of elasticity of substitution one can have,

$$\hat{X} = \hat{\bar{S}} - \hat{a}_{sx} \tag{14}$$

$$\hat{Y}\lambda_{ly} + \hat{Z}\lambda_{lz} = \lambda_{lz}\sigma_z\theta_{kz}(\hat{w} - \hat{r}) - \lambda_{ly}\sigma_y\theta_{ky}\hat{r} \tag{15}$$

$$\hat{Y}\lambda_{ky} + \hat{Z}\lambda_{kz} = -\lambda_{kz}\sigma_z\theta_{lz}(\hat{w} - \hat{r}) + \lambda_{ky}\sigma_y\theta_{ly}\hat{r} - \lambda_{kx}\sigma_x(\hat{w}_s - \hat{r}) \tag{16}$$

Where,

$$\sigma_x = \frac{\hat{a}_{kx} - \hat{a}_{sx}}{\hat{w}_s - \hat{r}},\ \sigma_y = \frac{\hat{a}_{ky} - \hat{a}_{ly}}{\hat{\bar{w}} - \hat{r}},\ \sigma_z = \frac{\hat{a}_{kz} - \hat{a}_{lz}}{\hat{w} - \hat{r}}$$

Solving for $\hat{X}$, $\hat{Y}$, and $\hat{Z}$ we get

$$\hat{X} = \sigma_x(\hat{w}_s - \hat{r})\theta_{kx} \tag{17}$$

$$\hat{Y} = \frac{1}{|\lambda|}\left[\lambda_{lz}\lambda_{kz}\sigma_z\theta_{kz}(\hat{w} - \hat{r}) - \lambda_{ly}\lambda_{kz}\sigma_y\theta_{ky}\hat{r} - \lambda_{lz}\lambda_{ky}\sigma_y\theta_{ly}\hat{r} + \lambda_{kx}\lambda_{lz}\sigma_x(\hat{w}_s - \hat{r}) + \lambda_{lz}\lambda_{kz}\sigma_z\theta_{lz}(\hat{w} - \hat{r})\right] \tag{18}$$

$$\hat{Z} = \frac{1}{|\lambda|}\Big[\lambda_{ly}\lambda_{ky}\sigma_y\theta_{ly}\hat{r} + \lambda_{ly}\lambda_{ky}\sigma_y\theta_{ky}\hat{r} - \lambda_{kx}\lambda_{ly}\sigma_x(\hat{w}_s - \hat{r}) - \lambda_{ly}\lambda_{kz}\sigma_z\theta_{lz}(\hat{w} - \hat{r})$$
$$- \lambda_{lz}\lambda_{ky}\sigma_z\theta_{kz}(\hat{w} - \hat{r})\Big] \tag{19}$$

If Y is relatively capital intensive (compared to Z), $|\lambda| < 0$. On the other hand when if capital's share of cost is higher in X relative to Y, that is, $\frac{\theta_{kx}}{\theta_{ky}} > 1$, $(\hat{w}_s - \hat{r}) > 0$. In that case, the outcomes are quite unambiguous: $\hat{X} > 0$,[9] $\hat{Z} > 0$ and $\hat{Y} > 0$. This result resembles the complementarity nature in the production of X and Z. Thus we state the following proposition:

Proposition 2.
A recessionary phase leads to the expansion of informal activities along with skilled product but the unionized formal segment shrinks. The precise condition for this outcome is $\theta_{kx} > \theta_{ky}$ and Y is capital intensive compared to Z.

Proof.
See the above analysis.

Here it is not less interesting to see how the fortunes of informal workers fluctuate where the recessionary effect is taking place first. Say P_x decreases keeping P_y constant, r would remain unaffected and w_s has to absorb the entire shock of a price cut in X. Note that $\hat{w}_s > \hat{P}_x$ as $0 < \theta_{sx} < 1$. On the other hand as there is no change in P_z (by assumption) and r, informal wage w would remain unaltered. Whereas if P_y falls keeping P_x unperturbed, r has to fall. As r falls w_s must increase. Similarly, the informal wage w will also increase. These two effects depict the extreme form of effects on informal wage. The generalization of these two effects together is discussed in the preceding paragraphs.

Variant of the Basic Model

It is often argued that the nature of capital that formal and informal sector use are not identical. Formal segment of the society might have the option to borrow financial capital from government or non-government banks but the informal sector has to rely heavily on the local private money lenders due to inherent extra-legality. Informal production units can survive without any permanent production house but it is not possible for formal production units. These features are very much prevalent in the developing economies which are vastly covered with informal units and are the prime focus of the current article. Therefore, it would not be insensible to introduce a variant of the basic model with the following variations.

Here, we consider the basic model with capital immobility between formal and informal sectors. Let us assume that X and Y use same capital and the informal good Z uses different kind of capital.[10] First, we talk about the intuitive explanations as to what happens to informal wage. If only P_x falls there would be no change in r but w_s would fall unambiguously. As w_s falls, X producers economize

on the usage of capital leading to an increase in a_{sx}. Therefore, formal skilled output contracts (from full employment condition). Capital will move out of X to Y and consequently the output of Y expands. The expansion in output creates an upsurge in demand for unskilled workers. This will cause an increase in informal wage w.

However, when only P_y falls, r must fall causing an increase in w_s. Since relative factor prices change, the quantity of output will also be adjusted through the elasticity of substitution. Here, a_{sx} will go down and X would expand. This is possible only when capital comes from Y. The moment capital goes out of Y, some unskilled labourers are also released from Y. This chunk of labour goes to Z and pushes w down.

Therefore, what happens to informal wage that not only depends on which sector is internalizing the recessionary shock but the mobility of capital as well. With immobile capital, we get distinctly different effects on W due to a similar kind of shocks compared to the structure with perfect inter-sectorally mobile capital.

Now, let us establish our intuitive claim mathematically. The set of equations becomes

The price equations are as follows:

$$w_s a_{sx} + r a_{kx} = P_x \tag{20}$$

$$\bar{w}\, a_{ly} + r a_{ky} = P_y \tag{21}$$

$$w\, a_{lz} + R a_{Tz} = P_z \tag{22}$$

Full employment conditions are:

$$a_{sx}.X = \bar{S} \tag{23}$$

$$a_{ly}.Y + a_{lz}.Z = \bar{L} \tag{24}$$

$$a_{kx}.X + a_{ky}.Y = \bar{K} \tag{25}$$

$$a_{TZ}.Z = \bar{T} \tag{26}$$

Following the same process that we applied earlier, we can easily calculate the values of the following:

$$\hat{r} = \frac{\hat{P}_y}{\theta_{ky}}; \hat{w}_s = \left(\hat{P}_x - \frac{\hat{P}_y}{\theta_{ky}} \theta_{kx} \right) \frac{1}{\theta_{sx}}$$

$$\hat{X} = \sigma_x \frac{\theta_{kx}}{\theta_{sx}} \left(\hat{P}_x - \frac{\hat{P}_y}{\theta_{ky}} \right) \tag{27}$$

$$\hat{Y} = (-)\frac{\lambda_{kx}}{\lambda_{ky}}\sigma_x \frac{\theta_{kx}}{\theta_{sx}}\left(\hat{P}_x - \frac{\hat{P}_y}{\theta_{ky}}\right) \tag{28}$$

$$\hat{Z} = -\theta_{lz}\sigma_Z\left(\hat{w} - \hat{R}\right) \tag{29}$$

Through a simple manipulation, we can arrive at the desired expression for $\hat{w}$.

$$\hat{w} = (-)\frac{\lambda_{ly}}{\lambda_{lz}}\frac{\lambda_{kx}}{\lambda_{ky}}\frac{\theta_{Tz}}{\theta_{lz}}\frac{\theta_{kx}}{\theta_{sx}}\frac{\sigma_x}{\sigma_z}\left(\hat{P}_x - \frac{\hat{P}_y}{\theta_{ky}}\right) \tag{30}$$

A careful investigation of equation (30) discloses that if only P_x falls w would increase and w would fall if P_y falls. If both P_x and P_y fall at the same rate, w falls unequivocally as $\theta_{ky} < 1$. One can easily follow the implications for $\hat{X}$, $\hat{Y}$ and $\hat{Z}$ under these conditions. Note that when w decreases (increases) R must increase (decrease) as P_z is assumed to be constant.

Proposition 3.
In immobile capital model, fate of informal workers depend on which formal segment is hurt by recession and how much.

Conclusion and Possible Extensions

We have constructed a general equilibrium trade model with informal sector to substantiate what could happen to skilled labour, and capitalist, commodity production due to economic recession. It is shown that the capitalists are the worst sufferers of this situation. However, the informal sector, which provides alternative opportunity for unskilled workers, actually expands subsequent upon this exogenous shock. Informal workers, in fact, may gain even in 'all-losing' scenario. On the output front, the informal segment grows and the formal segment has mixed outcome. Skilled labour-using production goes up whereas unskilled labour using the formal segment contracts. It has also been explained here what role the capital mobility plays in determining the effect of recessionary change on output, on factor return in general and on informal wage in particular.

The structure that we have used in this article is merely a general one where we got some basic results by using the standard trade theoretic arguments. However, this model can easily be applied to show how a recessionary phase could help ameliorating the wage inequality conundrum. In fact, the result is quite apparent from our model. On the other hand, if we assume the capital market to be administered, the first blow would be on the labour market, be it skilled or unskilled. Labour would suffer the most. One can also introduce some institutional problems like bureaucratic corruption, associated with the so-called 'extra-legal' sector, in our framework to show that the recession not only helps augmenting the informal

segment but also enhances the degree and size of intermediation activities required to take care of institutional complications. Depending upon the specific production function for intermediation, there might be subsequent Rybczynski effects on outputs as well. Lastly, our model can easily be extended to bring in an importable intermediate input producing sector which supplies its output as input to the skilled goods sector. Then one can check the simultaneous effects of recession and trade reform (assuming import to be subject to tariff and no export drawback system is applied). In the structure that we just laid down one can easily bring in the issue of determination of P_z where equilibrium P_z depends on income from X and Y. Hence, due to recession, demand for Z should fall and subsequently leads to a fall in P_z. Thus, the effect on w would be modified further. From a different perspective, we can assume the informal sector to supply a low-quality substitute good for the high-quality formal goods. A recession would cause a shift in demand in favour of informal goods. Thus, P_z should increase and consequent change in w would be there. In fact, one could also consider the situation where the informal sector supplies an input to the formal sector. Here, implications for w would be very interesting under different conditions coupled with recession.

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Notes

1. However, empirical support in favour of such claim is very difficult to provide. Nevertheless, the apprehension is that people may switch from high-price to low-price (sometime low in quality as well) imperfect substitute good or existing customer may move much away from informal good, for that these are not luxury, rather fall in the category of necessity and/or normal good.
2. The beauty of such structure is that in spite of being primarily meant for analyzing trade related issues, this framework is widely used by development economist more often than not to take into account of any development issues, macroeconomic policies, tax policies etc. The general equilibrium nature, moreover, also helps to look at the interconnectedness of different sectors and their dependence on distantly related policy matters.
3. The way I define informal sector is very simplistic in a sense that I keep skill-sector out of the informal boundary even though it does not enjoy formal trade-union determined wage and has to face global competitive open market. I use the notion of 'excluded' people to define informal sector. This criterion is satisfied only in unorganized unskilled sector. Marjit and Kar (2011) is a very good collection of such articles where this approach has been used in a whole lot of papers. In addition, Kim and Song (2008) is an interesting reference in this connection though it deals with the Korean economy.
4. However, informal good could be assumed to be traded as well. The prime thing that we assume here is an unchanged price of informal good. Here it is also important to

mention that one can easily determine the equilibrium price of non-traded informal good following any standard Cobb-Douglas preference for informal good. See Marjit and Kar (2009) for further details.

5. See footnote 1 for a related issue.
6. Note that both $\hat{P}_x$ and $\hat{P}_y$ are negative. Thus, the condition for $\hat{w}_s$ to be negative should read as $\frac{\hat{P}_x}{\hat{P}_y} > \frac{\theta_{kx}}{\theta_{ky}}$.
7. If there is no change in P_y, w_s should in fact rise. This is also true from the condition mention at footnote 3. But we are not at all interested in this phenomenon because this is not what happened in reality.
8. If the informal good is considered to be a substitute for the formal unskilled good, price of the informal good must rise because of an increase in demand. Traditionally formal good's price is greater than that of informal good. When P_y goes up, people start moving towards a low-priced substitute or close substitute in the informal sector. Hence, P_z rises and w increases further.
9. This outcome is quite interesting. Say production of X has risen. Due to lack of demand, caused by people's attitude of not spending much now on high-priced goods, P_x would fall further and hence will strengthen the losses of capital and skilled labor. The economic intuition for this baffling result is not complicated. Since r falls more than w_s producers try to employ more capital in order to economize on skilled labour usage. Given the endowment of skilled labour X output goes up as required capital comes from Y.
10. For a similar kind of model with the endogenous determination of P_z refer to Marjit and Kar (2009).

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